

c) From eq. 2.30 and 2.31 in the textbook

$$p' \sin \theta = p_e \sin \phi \quad (1)$$

and $p - p' \cos \theta = p_e \cos \phi \quad (2)$

$$\begin{aligned} \frac{(1)}{(2)} \Rightarrow \tan \phi &= \frac{p' \sin \theta}{p - p' \cos \theta} = \frac{\frac{h \sin \theta}{\lambda'}}{\frac{h}{\lambda} - \frac{h \cos \theta}{\lambda'}} \\ &= \frac{\frac{\sin \theta}{\lambda'}}{\frac{1}{\lambda} - \frac{\cos \theta}{\lambda'}} = \frac{\frac{\sin \theta}{\lambda'}}{\frac{\lambda' - \lambda \cos \theta}{\lambda \lambda'}} \\ &= \frac{\lambda \sin \theta}{\lambda' - \lambda \cos \theta} \end{aligned}$$

$$\begin{aligned} \phi &= \tan^{-1} \left(\frac{0.118 \sin 122.6^\circ}{0.155 - 0.118 \cos 122.6^\circ} \right) \\ &= \tan^{-1} \left(\frac{0.0994}{0.2186} \right) = \tan^{-1} (0.455) \end{aligned}$$

$$\boxed{\phi = 24.5^\circ}$$